

## **Amendments to the Claims**

This listing of claims replaces all prior versions, and listings, of claims in the application:

### **Listing of claims**

1. (Currently amended) An optical add/drop multiplexing system, comprising:
  - a first optical system, said first optical system including a first series of optical components comprising a first grating, a second grating and a third grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another; said first grating being capable of separating input optical radiation from said first beam/port into distinct input channels; said second grating being capable of redirecting said distinct input channels;
  - a second optical system, said second optical system including a second series of optical components comprising a fourth grating, a fifth grating and a sixth grating, a third beam/port and a fourth beam/port, all of said second series of optical components optically aligned with one another;
  - a pixellated, switchable grating, said pixellated, switchable grating having a plurality of pixels, each of said pixels having a controllable state, said controllable state having at least two state values, one of said at least two state values corresponding to substantially transmitting an incident beam; another one of said at least two state values corresponding to substantially diffracting said incident beam; said pixellated, switchable grating being interposed optically between said first optical system and said second optical system;
  - said second grating being capable of redirecting said distinct input channels towards said pixellated, switchable grating and being capable of substantially redirecting at least a portion of said distinct input channels towards said third grating; said at least a portion of said distinct input channels being incident on at least one pixel from said plurality of pixels; said at least one pixel being in said one of said two state values;
  - said third grating being capable of recombining said at least a portion of said distinct input channels for output into said second beam/port;
  - at least another portion of said distinct input channels being capable of being diffracted; and

means operably connected to said pixellated grating for controlling the state of each of said pixels;

wherein a plurality of wavelength division multiplexed signals which pass through said first optical system and said second optical system can be individually exchangeable between said first optical system and said second optical system based upon the state of said pixels as said signals pass through said pixellated grating.

2. (Original) The optical add/drop multiplexing system as defined in claim 1, wherein said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating are each a non-switchable grating.

3. (Original) The optical add/drop multiplexing system as defined in claim 1, wherein at least one of said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating is a non-switchable grating.

4. (Original) The optical add/drop multiplexing system as defined in claim 1, wherein at least one of said gratings is a volume holographic grating.

5. (Original) The optical add/drop multiplexing system as defined in claim 4, wherein said at least one of said volume holographic gratings is a Polymer Dispersed Liquid Crystal (PDLC) grating.

6. (Currently amended) The optical add/drop multiplexing system as defined in claim 1, wherein said first grating, said third grating, said fourth grating and said sixth grating each have a preselected spatial frequency and said second grating, said ~~fourth~~ fifth grating and said pixellated, switchable grating each have twice said preselected spatial frequency.

7. (Original) The optical add/drop multiplexing system as defined in claim 1, wherein said first grating and said third grating are optically positioned substantially symmetrically with respect to said second grating, and said fourth grating and said sixth grating are optically positioned substantially symmetrically with respect to said fifth grating.

8. (Currently amended) An optical add/drop multiplexing system, comprising:

a first pair of gratings optically aligned with one another, and a second pair of gratings optically aligned with one another, said first and second pair of gratings being optically aligned with each other and forming a first optical system; one grating from said first pair of gratings being capable of separating input optical radiation into distinct input channels;

a third pair of gratings optically aligned with one another, said third pair of gratings forming a second optical system, said third pair of gratings including a switchable grating capable of being switched between states; said states comprising at least two states, one of said at least two states corresponding to substantially transmitting an incident beam; another one of said at least two state corresponding to substantially diffracting said incident beam;

said switchable grating of said third pair of gratings being optically interposed between one of each of said first pair and said second pair of gratings of said first optical system; another grating from said first pair of gratings being capable of redirecting said distinct input channels towards said switchable grating; said switchable grating being capable being switched to said one of said at least two states and of substantially transmitting at least a portion of said distinct input channels from said first pair of gratings to said second pair of gratings; said switchable grating being capable being switched to said another one of said at least two states and of substantially diffracting at least another portion of said distinct input channels towards another grating from said third pair of gratings; and

means operably connected to said switchable grating of said third pair of ratings for controlling the state of said switchable grating;

wherein wavelength division multiplexed input signals can be exchangeable between said first optical system and said second optical system based upon the state of said switchable grating.

9. (Currently amended) The optical add/drop multiplexing system as defined in claim 8, wherein said first optical system includes a first beam/port and a second beam/port, and said second optical system also includes at a third beam/port.

10. (Original) The optical add/drop multiplexing system as defined in claim 9 further comprising:

at least a fourth optical system, said at least a fourth optical system comprising a fourth pair of gratings, optically aligned with one another, said fourth pair of gratings including a switchable grating capable of being switched between states; and

means operably connected to said switchable grating of said fourth pair of gratings for controlling the state of said switchable grating of said fourth pair of gratings;

11. (Currently amended) An optical add/drop multiplexing system, comprising:

a first optical system, said first optical system including a first series of optical components comprising a first grating, a second grating and a third grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another[.,,];said first grating being capable of separating input optical radiation from said first beam/port into distinct input channels; and said second grating being a pixellated, switchable grating capable of being switched between states; said states comprising at least two states; one of said at least two states corresponding to substantially transmitting at least a portion of said distinct input channels; another one of said at least two states corresponding to substantially diffracting at least another portion of said distinct input channels; said second grating being capable of diffracting said at least another portion of said distinct input channels towards said third grating;

a second optical system, said second optical system including a second series of optical components comprising a fourth grating, a fifth grating and a sixth grating, a third beam/port and a fourth beam/port, all of said second series of optical components optically aligned with one another[.,,]said fourth grating being capable of separating input optical radiation from said third beam/port into distinct channels; and said fifth grating being a pixellated, switchable grating capable of being switched between states; said states comprising at least two fifth grating states; one of said at least two fifth grating states corresponding to substantially transmitting at least a portion of an incident beam; another one of said at least two fifth grating states corresponding to substantially diffracting at least another portion of said incident beam; said fifth grating being capable of diffracting said at least another portion of said distinct channels towards said sixth grating;

a non-switchable grating, said non-switchable grating being interposed optically between said first optical system and said second optical system; said non-switchable grating

being capable of receiving said at least a portion of said distinct input channels and of diffracting said at least a portion of said distinct input channels towards said fifth grating; and

means operably connected to said pixellated gratings for controlling the state of each of said pixels;

wherein a plurality of wavelength division multiplexed signals which pass through said first optical system and said second optical system can be individually exchangeable between said first optical system and said second optical system based upon the state of said pixels as said signals pass through said pixellated gratings.

12. (Original) The optical add/drop multiplexing system as defined in claim 11, wherein at least one of said gratings is a volume holographic grating.

13. (Original) The optical add/drop multiplexing system as defined in claim 12, wherein said at least one of said volume holographic gratings is a Polymer Dispersed Liquid Crystal (PDLC) grating.

14. (Original) The optical add/drop multiplexing system as defined in claim 11 further comprising a pixelated, switchable grating optically interposed between said second grating, said third grating, said fourth grating and said fifth grating.

15. (Original) The optical add/drop multiplexing system as defined in claim 14 further comprising:

a third optical system, said third optical system including a seventh grating, an eighth grating and a ninth grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another, and said second grating being a pixellated, switchable grating.

16. (Currently amended) An optical multiplexing/demultiplexing system comprising:

a plurality of gratings comprising at least five gratings including:

a first grating; and

a second grating;

a first beam/port; and,

a plurality of second beam/ports;

~~all of said plurality of gratings, said first beam/port and said plurality of second beam/ports~~ first series of optical components being optically aligned with one another;

wherein a plurality of wavelength division multiplexed signals which pass through said first beam/port and through said first and second grating; and,

wherein each one of the plurality of wavelength division multiplexed signals will pass through one of said plurality of second beam/ports;

at least one grating from said plurality of gratings being a pixellated, switchable grating capable of being switched between states; said states comprising at least two states; one of said at least two states corresponding to substantially transmitting at least a portion of an incident beam; another one of said at least two states corresponding to substantially diffracting at least another portion of said incident beam; said at least one grating being optically disposed between two other gratings from said plurality of gratings; said at least one grating being capable of transmitting said at least a portion of a beam incident from one of said two other gratings to another one of said two other gratings; and, said at least one grating being also capable of transmitting said at least another portion of a beam incident from one of said two other gratings to another grating from said said plurality of gratings.

17. (Currently amended) The optical multiplexing/demultiplexing system as defined in claim 16, wherein said at least one ~~of said~~ gratings is a volume holographic grating.